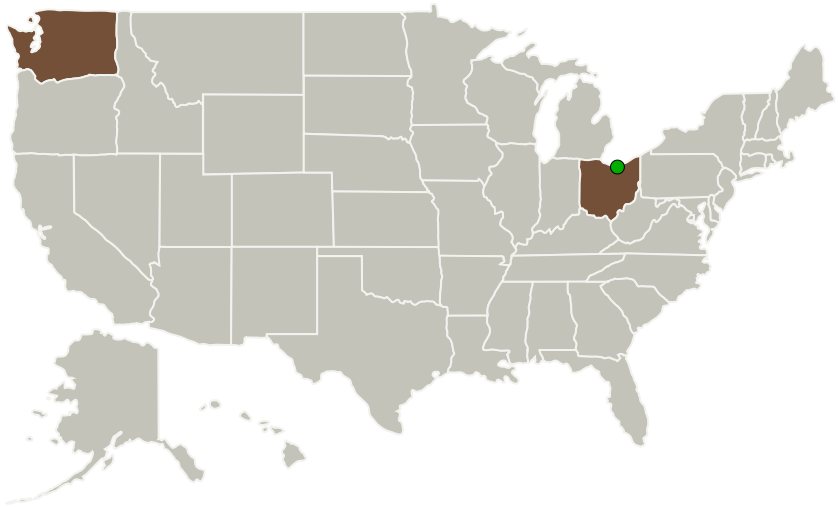
Integrated Propulsion and Primary Structure Module for Small Satellite and CubeSat Applications, Phase I

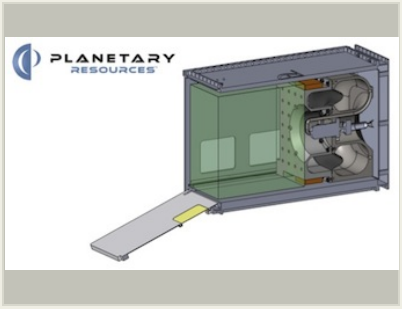
Completed Technology Project (2014 - 2014)

Project Introduction

Over the last decade, the CubeSat platform has emerged as a viable alternative for both innovative technology development and scientific investigation. However, to fully realize the platform's potential, propulsion capability is required. For low-cost spacecraft developers, this capability remains among the most resource intensive to successfully implement. Planetary Resources Development Corporation (PRDC) proposes to significantly reduce required resources by seamlessly integrating propulsion with another critical resource-intensive subsystem: the spacecraft's primary structure. PRDC will integrate high-reliability COTS components from the medical consumer products industries into an additively-manufactured primary structural element that includes integrated tank, plenum, and manifold geometries for a hybrid green monopropellant / cold-gas propulsion implementation in addition to the spacecraft's launch interface. The resulting module provides a standard interface, serving as the strongback for simple integration of other Cubesat subsystems and payloads within the 6U and 12U size regimes. During Phase I, PRDC will design, develop, and prototype a proof-of-concept configuration of the proposed integrated module and perform initial performance characterization of the system. Follow-on Phase 2 development would include fabrication, assembly, performance evaluation, and environmental test of a full- scale 12U module with integrated RCS and maneuvering thruster capability, resulting in a TRL 6 readiness level.

Primary U.S. Work Locations and Key Partners





Integrated Propulsion and Primary Structure Module for Small Satellite and CubeSat Applications Project Image

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Organizations Performing Work	Role	Type	Location
Planetary Resources Development Corporation	Lead Organization	Industry	Bellevue, Washington
Glenn Research Center(GRC)	Supporting Organization	NASA Center	Cleveland, Ohio

Primary U.S. Work Locations	
Ohio	Washington

Project Transitions

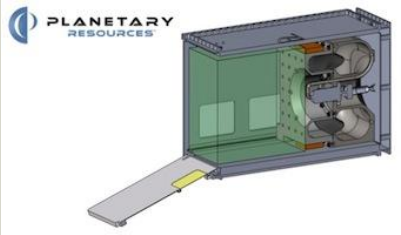
June 2014: Project Start

December 2014: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/140593)*

Images



Project Image
Integrated Propulsion and Primary Structure Module for Small Satellite and CubeSat Applications Project Image
(https://techport.nasa.gov/image/133198)

Organizational Responsibility

Responsible Mission Directorate:
Space Technology Mission Directorate (STMD)

Lead Organization:
Planetary Resources Development Corporation

Responsible Program:
Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:
Jason L Kessler

Program Manager:
Carlos Torrez

Principal Investigator:
Chris Voorhees

Co-Investigator:
Chris Voorhees

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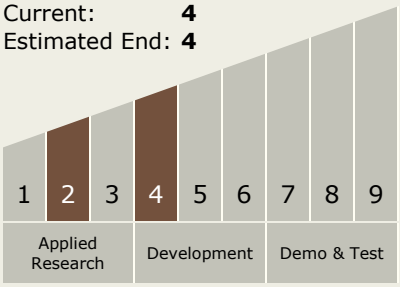
Technology Maturity (TRL)

Start: **2**
Current: **4**
Estimated End: **4**



Technology Areas

Primary:

- TX01 Propulsion Systems
  - TX01.1 Chemical Space Propulsion
    - TX01.1.4 Solids

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System